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(54) Title: **PROTECTION OF NON-CARBON ANODES AND OTHER OXIDATION RESISTANT COMPONENTS WITH IRON OXIDE-CONTAINING COATINGS**

(57) **Abstract:** A method of forming a dense and crack-free hematite-containing protective layer on a metal-based substrate for use in a high temperature oxidising and/or corrosive environment comprises applying onto the substrate a particle mixture consisting of: 60 to 99.95 weight%, in particular 70 to 95 weight% such as 75 to 85 weight%, of hematite with or without iron metal and/or ferrous oxide; 1 to 25 weight%, in particular 5 to 20 weight% such as 8 to 15 weight%, of nitride and/or carbide particles, such as boron nitride, aluminium nitride or zirconium carbide particles; and 0 to 15 weight%, in particular 5 to 15 weight%, of one or more further constituents that consist of at least one metal or metal oxide or a heat-convertible precursor thereof. The hematite particles are then sintered by heat treating the particle mixture to form the protective layer that is made of a microporous sintered hematite matrix in which the nitride and/or carbide particles are embedded and which contains, when present, said one or more further constituents. The mechanical, electrical and electrochemical properties of the protective layer can be improved by using an oxide of titanium, zinc, zirconium or copper. Typically, the protected substrate can be used in a cell for the electrowinning of a metal such as aluminium.